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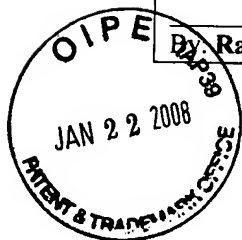
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Date

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Our Case No. 2003P04639US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Nadadur et al.

Serial No.: 10/608,284

Filed: June 27, 2003

For: Medical Image User Interface for
Cardiac Imaging

Examiner: Nguyen

Group Art Unit: 2174

APPEAL BRIEF

Mail Stop Appeal Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This Appeal Brief is in response to the Final Office Action mailed June 20, 2007, the Notice of Appeal filed October 22, 2007, and the Notice of Panel Decision from Pre-Appeal Brief Review mailed December 14, 2007.

I. Real Party in Interest

Siemens Medical Solutions USA, Inc. is the real party in interest.

II. Related Appeals and Interferences

There are no related appeals or interferences that may directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 10, 21, and 31 have been cancelled, and Claims 1-9, 11-20, 22-30, and 32-36 are pending. Claims 1-9, 11-20, 22-30, and 32-36 have been rejected and are the subject of this appeal.

IV. Status of Amendments

No amendments have been filed subsequent to the final rejection.

V. Summary of Claimed Subject Matter

Independent Claim 1 is directed to a method for displaying a medical image. A moving medical image 110 of a beating heart comprising a sequence of image frames is displayed in a first display area 100 (See Figure 1; act 510 in Figure 2; page 2, lines 19-21 and 28-29; and page 4, lines 13-18). A plurality of image frames 210 of the sequence of image frames of the medical image is displayed in a second display area 200. (See Figure 1; act 520 in Figure 2; and page 4, lines 18-19). The plurality of image frames 210 are acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle. (See page 4, lines 19-24). A data plot 310 or 320 is displayed in a third display area 300. (See Figure 1; act 530 in Figure 2; and page 5, lines 5-8). The first, second, and third display areas 100, 200, 300 are simultaneously displayed. (See Figure 1 and page 2, lines 12-18).

Independent Claim 17 is directed to a method for displaying a medical image. This method comprises simultaneously displaying a moving medical image 110 of a beating heart in a first display area 110, wherein the medical image of the beating heart comprises a sequence of image frames, and a plurality of image frames 210 of the sequence of image frames of the medical image 110 in a second display area 200, wherein the plurality of image frames 210 are acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle. (See Figure 1; acts 510 and 520 in Figure 2; page 2, lines 19-21 and 28-29; and page 4, lines 13-24). A selection of an image frame in the second display area 200 is received, and the selected image frame is displayed in the first display area 100. (See Figure 1 and page 6, lines 10-14).

Independent Claim 27 is directed to a system for displaying a medical image. This system comprises at least one display device 630 and a processor 620. (See Figure 3 and page 3, line 30 – page 4, line 3). The processor 620 is operative to simultaneously display a moving medical image 110 of a beating heart in a first display area 100, wherein the medical image 110 of the beating heart comprises a sequence of image frames, and a plurality of image frames 210 of the sequence of image frames of the medical image 110 in a second display area 200 on the at least one display device 630, wherein the plurality of image frames are acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle. (See Figure 1; acts 510 and 520 in Figure 2; page 2, lines 19-21 and 28-29; and page 4, lines 13-24). The processor 620 is further operative to, in response to receiving a selection of an image frame in the second display area 200, display the selected image frame in the first display area 100. (See Figure 1 and page 6, lines 10-14).

VI. Grounds of Rejections to Be Reviewed on Appeal

1. Whether Claims 1-5, 9, 11-20, 22-30, and 32-36 are unpatentable under 35 U.S.C. § 103(a)¹ over U.S. Patent No. 6,708,055 to Geiser et al. in view of U.S. Patent Publication No. US-2004/0077952 to Rafter et al. and further in view of U.S. Patent Publication No. US-2003/0016852 to Kaufman et al.

2. Whether Claims 6-8 are unpatentable under 35 U.S.C. § 103(a) over Geiser et al., Rafter et al., and Kaufman et al. and further in view of U.S. Patent No. 6,741,672 to Gaddipati et al.

VII. Argument

A. 35 U.S.C. § 103(a) Rejections of Claims 1-5, 9, 11-20, 22-30, and 32-36

1. Independent Claims 1, 17, and 27

Independent Claims 1, 17, and 27 each recite elements relating to displaying, in a first display area, a moving medical image of a beating heart comprising a sequence of image frames and displaying, in a second display area, a plurality of image frames of the sequence of image frames of the medical image acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle. These claims were rejected under 35 U.S.C. § 103(a) in view of the proposed combination of Geiser et al., Rafter et al., and Kaufman et al. Applicants respectfully submit that these rejections should be withdrawn because (1) the proposed combination does not teach each and every element in the claims and (2) one skilled in the art would not have combined Geiser et al., Rafter et al., and Kaufman et al.

¹ The Office Action stated that the claims were rejected under 35 U.S.C. § 102(e); however, it is clear from the heading and rejection itself that this is a typographical error.

**i. The Proposed Combination Does Not Teach
Each and Every Element in the Claims**

In the Office Action, it was admitted that Geiser et al. does not teach displaying a plurality of image frames acquired at end-diastolic (ED) and end-systolic (ES) portions of a beating heart's cycle. By virtue of the prior § 102 rejection based on Kaufman et al. being withdrawn, the Office Action also admitted that Kaufman et al. does not disclose this element. Rafter et al. was relied upon to cure these deficiencies, but Rafter et al. also does not teach this element.

The Abstract, Figure 7A, and paragraphs 89 and 93 of Rafter et al. were cited as purportedly teaching the admittedly-missing element. However, none of these cited portions teach displaying a plurality of image frames acquired at end-diastolic (ED) and end-systolic (ES) portions of a beating heart's cycle. The Abstract mentions an operator interface configured to receive an operator preference for spatially arranging a plurality of images. Paragraph 89 mentions that one of the buttons on the operator interface (the end-systolic pushbutton 761) displays images acquired at end of systole and that another button (the end-diastolic pushbutton 763) displays images acquired at end of diastole. Accordingly, Rafter et al. merely teaches the use of the end-systolic pushbutton 761 and the end-diastolic pushbutton 763 to view image frames at the *same portion* of the cardiac cycle — *either* at end of systole (when the end-systolic pushbutton 761 is pushed) *or* end of diastole (when the end-diastolic pushbutton 763 is pushed). This is even how the Examiner characterizes the teaching of Rafter et al.: "it is often desirable to and useful to observe and compare multiple images of the heart at the *same portion* of the cardiac cycle." June 20, 2007 Office Action, page 3 (emphasis added). However, independent Claims 1, 17, and 27 each recite elements relating to displaying a plurality of image frames of the

sequence of image frames acquired at both end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle. Accordingly, while independent Claims 1, 17, and 27 recite displaying image frames acquired at *different* heart cycles (end-diastole and end-systole), Rafter et al. (and, hence, the proposed combination) only teaches displaying image frames acquired at the *same* heart cycle (either end-diastole or end-systole).

In the Advisory Action, the Examiner asserted that Rafter et al. teaches displaying a plurality of systolic and diastolic images because paragraph 93 teaches that an image manager can be programmed with the flexibility to permit comparison of different parts of one loop to different parts of the same loop or another loop acquired at a certain patient condition or anatomical view. However, while paragraph 93 teaches that images from a cardiac cycle at rest can be compared to images from a cardiac cycle at peak stress, there is no teaching that one of these images is a systolic image and another is a diastolic image. It is clear from paragraph 93 and the preceding paragraphs that this passage in Rafter et al. merely teaches that the preceding concepts of displaying image frames acquired at the *same* heart cycle (either end-diastole or end-systole) can be applied to different loops so that, for example, a systolic image taken of a heart at rest can be compared to a systolic image taken of a heart during stress. Further, although the Examiner speculated that "peak stress" refers to systole, it is clear from paragraph 93 of Rafter et al. that "peak stress" refers to a different "patient condition" — not systole.

In summary, because Rafter et al. does not cure the admitted deficiency in Geiser et al. and Kaufman et al., the proposed combination fails to render independent Claims 1, 17, and 27 unpatentable. Accordingly, Applicants respectfully request withdrawal of the rejections against independent Claims 1, 17, and 27 and their dependent claims.

**ii. One Skilled in the Art Would Not Have Combined
Geiser et al., Rafter et al., and Kaufman et al.**

Applicants further submit that one skilled in the art would not have combined Geiser et al., Rafter et al., and Kaufman et al. because Kaufman et al. teaches away from such a combination. Kaufman et al. is directed to a system in which still images (or slices) of an organ are acquired and displayed. The still images are used to construct a three-dimensional composite image. With reference to the user interface in Figure 2 of Kaufman et al., the selected image 42 is a still image (or slice) of a heart, and images 56 and 58 represent the previous and next slices to be shown in area 42. The images in areas 48 and 50 are image projections of selected slices, with the image in area 48 representing a projection made from all of the slices in the image, and the image in area 50 representing a projection made from only selected image slices.

Because Kaufman et al. desires to obtain and display a still image of the heart, Kaufman et al. views heart motion as noise that will cause blurring of the image. Kaufman et al. recognizes that the blurring of an image is most likely to occur during systole, where the heart is in motion, and less likely to occur during diastole, where the heart is relatively motionless. To take advantage of these conditions, Kaufman et al. uses a gating function so as to only use the still images taken at diastole, where the heart is relatively motionless, and not at systole, where the heart is in motion. As such, Kaufman et al. teaches against the combination with Rafter et al., which was relied upon for its teaching of displaying images at systole. Under the proposed combination, the addition of Rafter et al. would introduce the very problem that Kaufman et al. is specifically trying to avoid. Because of this, one skilled in the art would not have combined the references as proposed in the Office Action.

Significantly, the Advisory Action does not address Applicants' teaching away argument. Irrespective of the general and vague purported motivations proffered in the Advisory Action, the fact is that Kaufman et al. teaches against the proposed combination, and, as such, one skilled in the art would not have combined the references as proposed in the Office Action.

2. Additional Arguments with Respect to Independent Claim 1

Independent Claim 1 further recites displaying a data plot in a third display area, wherein the first, second, and third display areas are simultaneously displayed. Even if the proposed combination has three display areas simultaneously displayed, these three display areas do not meet the recitations of those areas in independent Claim 1, as discussed above. Accordingly, this additional element is also not shown in the proposed combination.

3. Additional Arguments with Respect to Independent Claim 17

Independent Claim 17 further recites receiving a selection of an image frame in the second display area and displaying the selected image frame in the first display area. Even if the proposed combination teaches general selection and display functionality, the first and second display areas do not meet the recitations of those areas in independent Claim 17, as discussed above. Accordingly, this additional element is also not shown in the proposed combination.

4. Additional Arguments with Respect to Independent Claim 27

Independent Claim 27 recites that the processor is further operative to, in response to receiving a selection of an image frame in the second display area, display the selected image frame in the first display area. Even if the proposed combination teaches a processor with general selection and display functionality, the first and second display areas do not meet the recitations of those areas in independent Claim 27, as discussed above. Accordingly, this additional element is also not shown in the proposed combination.

B. 35 U.S.C. § 103(a) Rejections of Claims 6-8

Claims 6-8 each depend on Claim 3, which depends on independent Claim 1. Dependent Claim 6 recites that act (a) in Claim 3 comprises receiving a selection of the medical image in the first display area and that act (b) in Claim 3 comprises pausing the display of the medical image. Dependent Claim 7 recites that the receiving of the user selection in act (a) in Claim 3 suspends a medical image acquisition operation. Dependent Claim 8 recites the additional act of before act (a) in Claim 3, receiving a command to suspend a medical image acquisition operation. These claims were rejected under 35 U.S.C. § 103(a) in view of the proposed combination of Geiser et al., Rafter et al., Kaufman et al., and Gaddipati et al. Applicants respectfully submit that these rejections should be withdrawn because the proposed combination does not teach each and every element of the claims.

1. Claim 6

As a first matter, because independent Claim 1 is patentable over the proposed combination as discussed above, dependent Claim 6, which indirectly depends on Claim 1, is also patentable. Nevertheless, even if one were to accept the Examiner's position that Geiser et al., Rafter et al., and Kaufman et al. teach all of the elements except for those added in dependent Claim 6, the rejection of dependent Claim 6 should still be withdrawn because Gaddipati et al. does not cure the deficiency admitted by the Examiner. Specifically, in the Office Action, the Examiner admitted that the proposed combination of Geiser et al., Rafter et al., and Kaufman et al. does not teach the various elements recited in dependent Claim 6, and Gaddipati et al. was relied upon in an attempt to cure this deficiency. However, the cited passage in Gaddipati et al. merely teaches transitioning to a "scan paused" state when a user chooses to pause a scan. There is no teaching in this passage of receiving a selection of the medical image in the first display

area and pausing the display of the medical image, as recited in Claim 6. Accordingly, because Gaddipati et al. does not cure the admitted deficiency, the rejection of Claim 6 should be withdrawn.

2. Claim 7

Because independent Claim 1 is patentable over the proposed combination as discussed above, dependent Claim 7, which indirectly depends on Claim 1, is also patentable. Nevertheless, even if one were to accept the Examiner's position that Geiser et al., Rafter et al., and Kaufman et al. teach all of the elements except for those added in dependent Claim 7, the rejection of dependent Claim 7 should still be withdrawn because Gaddipati et al. does not cure the deficiency admitted by the Examiner. Specifically, in the Office Action, the Examiner admitted that the proposed combination of Geiser et al., Rafter et al., and Kaufman et al. does not teach the various elements recited in dependent Claim 7, and Gaddipati et al. was relied upon in an attempt to cure this deficiency. However, the cited passage in Gaddipati et al. merely teaches transitioning to a "scan paused" state when a user chooses to pause a scan. There is no teaching in this passage that the receiving of the user selection in one of the first, second, and third display areas suspends a medical image acquisition operation, as recited in Claim 7. Accordingly, because Gaddipati et al. does not cure the admitted deficiency, the rejection of Claim 7 should be withdrawn.

3. Claim 8

Because independent Claim 1 is patentable over the proposed combination as discussed above, dependent Claim 8, which indirectly depends on Claim 1, is also patentable. Nevertheless, even if one were to accept the Examiner's position that Geiser et al., Rafter et al., and Kaufman et al. teach all of the elements except for those added in dependent Claim 8, the

rejection of dependent Claim 8 should still be withdrawn because Gaddipati et al. does not cure the deficiency admitted by the Examiner. Specifically, in the Office Action, the Examiner admitted that the proposed combination of Geiser et al., Rafter et al., and Kaufman et al. does not teach the various elements recited in dependent Claim 8, and Gaddipati et al. was relied upon in an attempt to cure this deficiency. However, the cited passage in Gaddipati et al. merely teaches transitioning to a "scan paused" state when a user chooses to pause a scan. There is no teaching in this passage of receiving, before a user selection in one of the first, second, and third display areas, a command to suspend a medical image acquisition operation, as recited in Claim 8. Accordingly, because Gaddipati et al. does not cure the admitted deficiency, the rejection of Claim 8 should be withdrawn.

VIII. Conclusion

In view of the foregoing arguments, Applicants respectfully submit that the outstanding rejections should be withdrawn and that this application should be passed to allowance. Reconsideration is respectfully submitted. If there are any questions, please contact Joseph F. Hetz (Reg. No. 41,070) at (312) 321-4719.

Dated: 1-14-08

Respectfully submitted,



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IX. Claims Appendix

1. A method for displaying a medical image, the method comprising:
 - displaying a moving medical image of a beating heart in a first display area, wherein the medical image of the beating heart comprises a sequence of image frames;
 - displaying a plurality of image frames of the sequence of image frames of the medical image in a second display area, wherein the plurality of image frames are acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle; and
 - displaying a data plot in a third display area;
 - wherein the first, second, and third display areas are simultaneously displayed.
2. The method of Claim 1, wherein a size of the image frames displayed in the second display area is smaller than a size of the medical image displayed in the first display area.
3. The method of Claim 1 further comprising:
 - (a) receiving a user selection in one of the first, second, and third display areas; and
 - (b) altering a display of at least one of the first, second, and third display areas in response to the received user selection.
4. The method of Claim 3, wherein (a) comprises receiving a selection of a point on the data plot in the third display area, and wherein (b) comprises:
 - displaying an indicator at the point selected on the data plot in the third display area;

displaying an image frame in the first display area corresponding to the point selected on the data plot; and

scrolling the plurality of image frames displayed in the second display area to the image frame corresponding to the point selected on the data plot.

5. The method of Claim 3, wherein (a) comprises receiving a selection of an image frame displayed in the second display area, and wherein (b) comprises:

displaying an indicator at a point on the data plot in the third display area corresponding to the selected image frame; and

displaying the selected image frame in the first display area.

6. The method of Claim 3, wherein (a) comprises receiving a selection of the medical image in the first display area, and wherein (b) comprises pausing the display of the medical image.

7. The method of Claim 3, wherein the receiving of the user selection in (a) suspends a medical image acquisition operation.

8. The method of Claim 3 further comprising, before (a), receiving a command to suspend a medical image acquisition operation.

9. The method of Claim 1 further comprising:

displaying a menu in a fourth display area.

11. The method of Claim 1, wherein the medical image comprises a live image.
12. The method of Claim 1, wherein the medical image comprises a recalled image.
13. The method of Claim 1, wherein the medical image comprises an ultrasound image.
14. The method of Claim 1, wherein the data plot comprises a graph of at least one of the following: end-diastolic volume, end-systolic volume, ejection fraction, stroke volume, stroke index, cardiac output, and cardiac index.
15. The method of Claim 1, wherein the first, second, and third display areas are displayed on a medical diagnostic image acquisition system.
16. The method of Claim 1, wherein the first, second, and third display areas are displayed on an image review system.
17. A method for displaying a medical image, the method comprising:
simultaneously displaying a moving medical image of a beating heart in a first display area, wherein the medical image of the beating heart comprises a sequence of image frames, and a plurality of image frames of the sequence of image frames of the medical image in a second

display area, wherein the plurality of image frames are acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle;

receiving a selection of an image frame in the second display area; and

displaying the selected image frame in the first display area.

18. The method of Claim 17, wherein a size of the image frames displayed in the second display area is smaller than a size of the medical image displayed in the first display area.

19. The method of Claim 17 further comprising displaying a data plot in a third display area, wherein the third display area is simultaneously displayed with the first and second display areas.

20. The method of Claim 19 further comprising displaying an indicator on the data plot corresponding to the selected image frame.

Claim 21 (Cancelled)

22. The method of Claim 17, wherein the medical image comprises a live image.

23. The method of Claim 17, wherein the medical image comprises a recalled image.

24. The method of Claim 17, wherein the medical image comprises an ultrasound image.

25. The method of Claim 17, wherein the first and second display areas are displayed on a medical diagnostic image acquisition system.
26. The method of Claim 17, wherein the first and second display areas are displayed on an image review system.
27. A system for displaying a medical image, the system comprising:
at least one display device; and
a processor operative to:
simultaneously display a moving medical image of a beating heart in a first display area, wherein the medical image of the beating heart comprises a sequence of image frames, and a plurality of image frames of the sequence of image frames of the medical image in a second display area on the at least one display device, wherein the plurality of image frames are acquired at end-diastolic (ED) and end-systolic (ES) portions of the beating heart's cycle; and
in response to receiving a selection of an image frame in the second display area, display the selected image frame in the first display area.
28. The system of Claim 27, wherein a size of the image frames displayed in the second display area is smaller than a size of the medical image displayed in the first display area.

29. The system of Claim 27, wherein the processor is further operative to display a data plot in a third display area, wherein the first, second, and third display areas are simultaneously displayed.

30. The system of Claim 29, wherein the process is further operative to display an indicator on the data plot corresponding to the selected image frame.

Claims 31 (Cancelled)

32. The system of Claim 27, wherein the medical image comprises a live image.

33. The system of Claim 27, wherein the medical image comprises a recalled image.

34. The system of Claim 27, wherein the medical image comprises an ultrasound image.

35. The system of Claim 27, wherein the at least one display device and processor are part of a medical diagnostic image acquisition system.

36. The system of Claim 27, wherein the at least one display device and processor are part of an image review system.

X. Evidence Appendix

None.

XI. Related Proceedings Appendix

None.